

WHAT IS CLAIMED IS:

1. A calcium phosphate-synthetic resin-metal composite body produced by pressing a metal member, a calcium phosphate block and a mixture of calcium phosphate particles, synthetic resin particles I, which  
5 are at least partially cross-linked in advance, and uncross-linked, synthetic resin particles II while heating, said calcium phosphate particles and/or said calcium phosphate block being exposed on at least part of the surface of said composite body.
2. The calcium phosphate-synthetic resin-metal composite body  
10 according to claim 1, wherein said synthetic resin particles I and II are bonded to said metal member, said calcium phosphate particles and said calcium phosphate block.
3. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein said calcium phosphate-synthetic resin-metal  
15 composite body comprises a calcium phosphate-synthetic resin composite layer composed of said calcium phosphate particles and said synthetic resin particles I and II, which covers the entire surface of said metal member.
4. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein said metal member is made of at least one  
20 metal or alloy selected from the group consisting of pure titanium, titanium alloys and stainless steel.
5. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein said synthetic resin particles I and II are made of a water-insoluble acrylic or polystyrene resin.
- 25 6. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein said calcium phosphate particles and/or said calcium phosphate block are sintered.
7. The calcium phosphate-synthetic resin-metal composite body

according to claim 1, wherein said calcium phosphate particles and said calcium phosphate block are porous.

8. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein at least part of said metal member has a 5 thickness of 0.5 mm or more.

9. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein the content of said synthetic resin particles II is 0.2 to 50% by mass based on the total amount of said synthetic resin particles I and II.

10 10. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein a mass ratio of said calcium phosphate particles to said synthetic resin particles is 1/9 to 8/2.

11. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein a calcium/phosphorus molar ratio in said 15 calcium phosphate particles and said calcium phosphate block is 1.4 to 2.0.

12. The calcium phosphate-synthetic resin-metal composite body according to claim 1, wherein said calcium phosphate particles have an average particle size of 0.001 to 10 mm.

13. The calcium phosphate-synthetic resin-metal composite body 20 according to claim 1, wherein said calcium phosphate block has a thickness of 1 mm or more.

14. A calcium phosphate-synthetic resin-metal composite body produced by pressing a metal member and a mixture of calcium phosphate particles, synthetic resin particles I, which are at least partially cross-linked 25 in advance, and uncross-linked, synthetic resin particles II while heating, said calcium phosphate particles being exposed on at least part of the surface of said composite body.

15. The calcium phosphate-synthetic resin-metal composite body

according to claim 14, wherein said synthetic resin particles I and II are bonded to said metal member and said calcium phosphate particles.

16. The calcium phosphate-synthetic resin-metal composite body according to claim 14, wherein said calcium phosphate-synthetic resin-metal composite body comprises a calcium phosphate-synthetic resin composite layer composed of said calcium phosphate particles and said synthetic resin particles I and II, which covers the entire surface of said metal member.

17. The calcium phosphate-synthetic resin-metal composite body according to claim 14, wherein said metal member is made of at least one metal or alloy selected from the group consisting of pure titanium, titanium alloys and stainless steel.

18. The calcium phosphate-synthetic resin-metal composite body according to claim 14, wherein said synthetic resin particles I and II are made of a water-insoluble acrylic or polystyrene resin.

19. The calcium phosphate-synthetic resin-metal composite body according to claim 14, wherein said calcium phosphate particles are sintered.

20. The calcium phosphate-synthetic resin-metal composite body according to claim 14, wherein said calcium phosphate particles are porous.

21. The calcium phosphate-synthetic resin-metal composite body according to claim 14, wherein at least part of said metal member has a thickness of 0.5 mm or more.

22. The calcium phosphate-synthetic resin-metal composite body according to claim 14, wherein the content of said synthetic resin particles II is 0.2 to 50% by mass based on the total amount of said synthetic resin particles I and II.

23. The calcium phosphate-synthetic resin-metal composite body

according to claim 14, wherein a mass ratio of said calcium phosphate particles to said synthetic resin particles is 1/9 to 8/2.

24. The calcium phosphate-synthetic resin-metal composite body

according to claim 14, wherein a calcium/phosphorus molar ratio in said

5 calcium phosphate particles is 1.4 to 2.0.

25. The calcium phosphate-synthetic resin-metal composite body

according to claim 14, wherein said calcium phosphate particles have an

average particle size of 0.001 to 10 mm.

26. The calcium phosphate-synthetic resin-metal composite body

10 according to claim 14, wherein said metal member has a hollow shape; and

wherein said calcium phosphate-synthetic resin composite layer covers the entire surface of said metal member.

27. The calcium phosphate-synthetic resin-metal composite body

according to claim 26, wherein said metal member has windows at which

15 said calcium phosphate-synthetic resin composite layer is open.

28. The calcium phosphate-synthetic resin-metal composite body

according to claim 14, wherein said calcium phosphate-synthetic

resin-metal composite body has a screw shape; and wherein a calcium phosphate-synthetic resin composite layer composed of said calcium

20 phosphate particles and said synthetic resin particles I and II is formed on a trunk of said metal member.

29. A method for producing a calcium phosphate-synthetic resin-metal

composite body comprising a metal member, calcium phosphate particles

(or calcium phosphate particles and a calcium phosphate block), synthetic

25 resin particles I, which are at least partially cross-linked in advance, and uncross-linked, synthetic resin particles II, said calcium phosphate particles

and/or said calcium phosphate block being exposed on at least part of the

surface of said composite body, said method comprising the steps of (a)

introducing said metal member, said calcium phosphate particles (or said calcium phosphate particles and said calcium phosphate block), and said synthetic resin particles I and II into a cavity of a molding die, such that said synthetic resin particles surround said calcium phosphate particles, and  
5 that said calcium phosphate particles and/or said calcium phosphate block are exposed on at least part of the surface of said composite body; and (b) pressing them in said molding die cavity while heating, so that said synthetic resin particles are bonded to said metal member and said calcium phosphate particles (or said calcium phosphate particles and said calcium phosphate block).  
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30. The method for producing a calcium phosphate-synthetic resin-metal composite body according to claim 29, wherein said metal member and a mixture of said calcium phosphate particles and said synthetic resin particles I and II are introduced into said cavity of said  
15 molding die such that said mixture surrounds said metal member.

31. The method for producing a calcium phosphate-synthetic resin-metal composite body according to claim 29 further comprising the step of sintering said calcium phosphate particles and/or said calcium phosphate block in advance.

20 32. The method for producing a calcium phosphate-synthetic resin-metal composite body according to claim 31, wherein the sintering temperature of said calcium phosphate particles and said calcium phosphate block is 500°C to 1,300°C.

25 33. The method for producing a calcium phosphate-synthetic resin-metal composite body according to claim 29, wherein said pressing/heating step is carried out in vacuum, or in an atmosphere containing no oxygen.

34. The method for producing a calcium phosphate-synthetic

resin-metal composite body according to claim 29, comprising using a hollow metal member; heating said hollow metal member filled with said mixture while pressing to provide a metal member-embedded composite body comprising said metal member filled with a calcium

- 5 phosphate-synthetic resin composite body; cutting away part of said calcium phosphate-synthetic resin composite body in said metal member-embedded composite body to make said calcium phosphate-synthetic resin-metal composite body hollow.

35. The method for producing a calcium phosphate-synthetic

- 10 resin-metal composite body according to claim 34, comprising using a metal member having windows; and grinding said calcium phosphate-synthetic resin composite body at positions corresponding to said windows to provide said calcium phosphate-synthetic resin-metal composite body with windows.

- 15 36. The method for producing a calcium phosphate-synthetic resin-metal composite body according to claim 29, comprising using a screw-shaped metal member; placing said screw-shaped metal member in a cavity of said molding die with a cap mounted on a thread of said metal member; charging a mixture of said calcium phosphate particles and said synthetic resin particles I and II into said die cavity; pressing said mixture while heating to form a calcium phosphate-synthetic resin composite body around said metal member; removing said cap from said screw-shaped metal member; and machining said calcium phosphate-synthetic resin composite body around a trunk of said metal member to provide said 20 calcium phosphate-synthetic resin-metal composite body with a threaded portion.

- 25 37. The method for producing a calcium phosphate-synthetic resin-metal composite body according to claim 36, comprising using a

molding die comprising a stationary die member having a cavity penetrating in a vertical direction; a lower punch having a cavity for receiving a screw-shaped metal member provided with a cap and entering into the cavity of said stationary die member from below; a protection die 5 having a cavity penetrating in a vertical direction and a cavity for receiving a head and said cap of said screw-shaped metal member provided with a cap and abutting said lower punch; and a vertically movable upper punch having a cavity having the same shape as that of said cavity of said lower punch at a position aligned with said cavity of said lower punch, and 10 entering into the vertical cavity of said protection die from above to abut said lower punch.

38. The method for producing a calcium phosphate-synthetic resin-metal composite body according to claim 37, comprising placing said lower punch in said cavity of said stationary die member after said 15 screw-shaped metal member provided with said cap is placed on said cavity of the lower punch; moving said protection die down so that said cavity of the protection die abuts said cavity of the lower punch; charging a mixture of said calcium phosphate particles and said synthetic resin particles I and II into the cavities of said lower punch and said protection die; moving said 20 upper punch down to press said mixture while heating, thereby forming a layer of a calcium phosphate-synthetic resin composite body on a trunk of said metal member.